SEMICONDUCTOR

SC45N120T

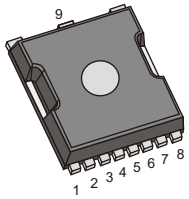
1200V 60A N-Channel SIC Power MOSFET

Features

- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- Easy to Parallel
- Simple to Drive

Product Summary			
V_{DS}	$R_{DS(on)}$(mΩ)Typ	I_D(A)	Qg(Typ)
1200V	45 @ 18V 20A	60	125nc

TOLL



Mechanical Data

- Case:TOLL Package

Application

- EV Charging
- Renewable Energy
- Automotive DC/DC converters
- Server Power Supplies

Pin Definition:

1. Gate
2. Driver Source
9. Drain
3/4/5/6/7/8. Power Source

Block Diagram

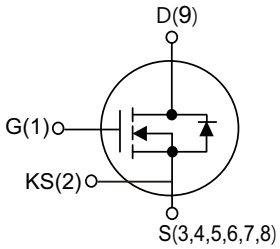


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	1200	V
Gate-Source Voltage(Max)		$V_{GS(max)}$	-10/+22	V
Recommend Gate-Source Voltage		V_{GSop}	-5/+18	V
Continuous Drain Current	T_C=25°C	I_D	60	A
	T_C=100°C		48	
Pulsed Drain Current (Note 1)		I_{DM}	100	A
Power Dissipation	T_C=25°C	P_D	218	W
Operating Junction and Storage Temperature		T_J/T_{STG}	-55 ~ +175	°C

Table 2.Thermal Characteristics

Parameter	Symbol	SC45N120T	Unit
Thermal resistance Junction to Case	$R_{\theta JC}$	0.69	°C/W
Thermal resistance Junction to Ambient	$R_{\theta JA}$	62	°C/W

Table 3. Electrical Characteristics (T_J=25°C, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=250μA	1200	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=1200V,V_{GS}=0V,T_J=25°C	-	5	100	μA
		V_{DS}=1200V,V_{GS}=0V,T_J=175°C	-	-	3.5	mA
Gate- Source Leakage Current	I_{GSS}	V_{GS}=-10V to 20V,V_{DS}=0V	-	-	250	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS},I_D=22mA	2.0	3.0	4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=18V,I_D=20A,T_J=25°C	-	45	52	mΩ
		V_{GS}=18V,I_D=20A,T_J=175°C	-	81	-	
Gate Resisitance	R_G	f=1MHz	-	4.2	-	Ω
Dynamic Characteristics						
Input Capacitance	C_{ISS}	V_{DS}=1000V,V_{GS}=0V, f=100KHz,V_{AC}=25mV	-	2565	-	pF
Output Capacitance	C_{OSS}		-	109	-	pF
Reverse Transfer Capacitance	C_{RSS}		-	4	-	pF
Turn-on switching energy	E_{ON}	V_{DS}=800V,I_D=30A, L=100μH,V_{GS}=-5/20V,T_J=175°C	-	556	-	μJ
Turn-off switching energy	E_{OFF}		-	93	-	μJ
Turn-On Delay Time	td(on)	V_{DS}=800V,V_{GS}=-5/20V, L=100μH,I_D=20A, R_G=2.5Ω	-	13	-	ns
Turn-On Rise Time	t_R		-	17	-	ns
Turn-Off Delay Time	td(off)		-	23	-	ns
Turn-Off Fall Time	tf		-	9	-	ns
Total Gate Charge	Q_G	V_{DD}=800V,I_D=20A, V_{GS}=-5/20V	-	125	-	nC
Gate-Source Charge	Q_{GS}		-	32	-	nC
Gate-Drain Charge	Q_{GD}		-	33	-	nC
Drain-Source Diode Characteristics and Maximum Ratings(Note 2)						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=20A	-	4.2	-	V
Continuous Diode Forward Current	I_S		-	55	-	A
Reverse Recovery Time	trr	V_{GS}=-5 V, I_F=20 A, V_R=800 V, di/dt=900A/μs, T_J=175°C	-	50	-	ns
Recovered charge	Qrr		-	712	-	nC
Peak reverse recovery current	Irrm		-	19	-	A

Notes: 1 RepetitiveRating Pulse width limited by maximum junction temperature

2 Pulse Test: Pulse width ≤300μS,Duty cycle≤2%

Typical Characteristics Diagrams

Fig1. Output characteristics (T_J = 25 °C)

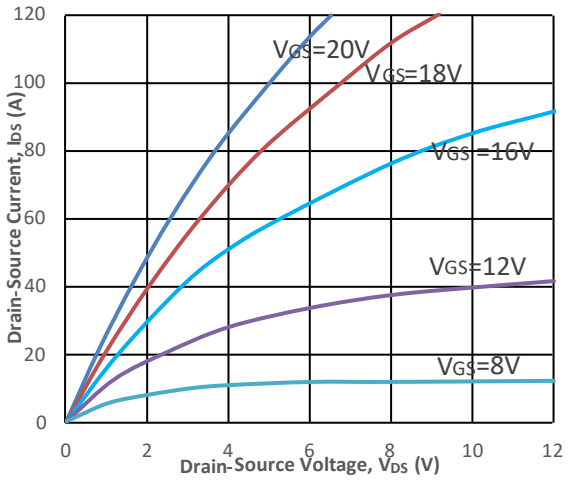


Fig2. Output characteristics (T_J = 175 °C)

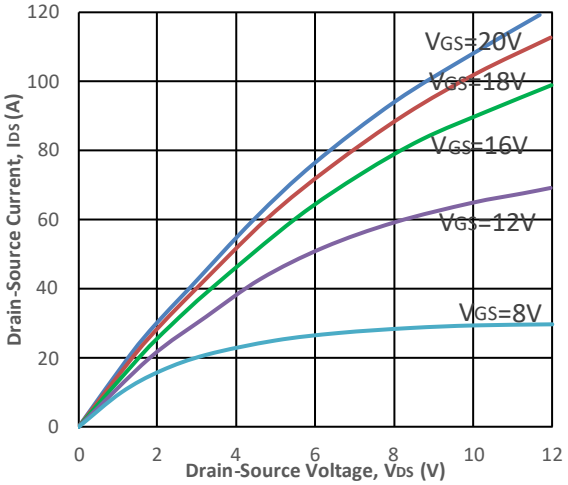


Fig3.Normalized On-Resistance vs. Temperature

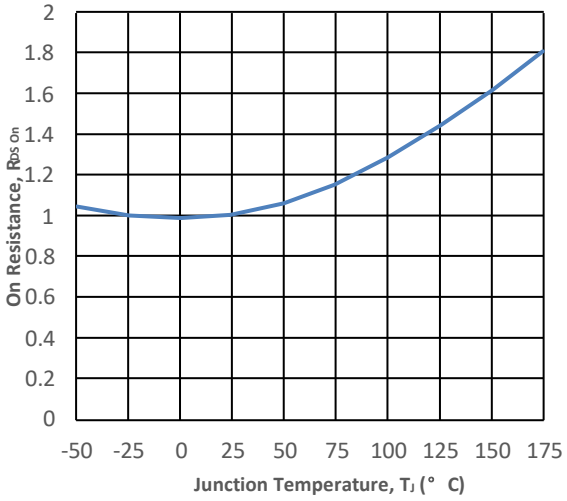


Fig4. On-Resistance vs. Temperature

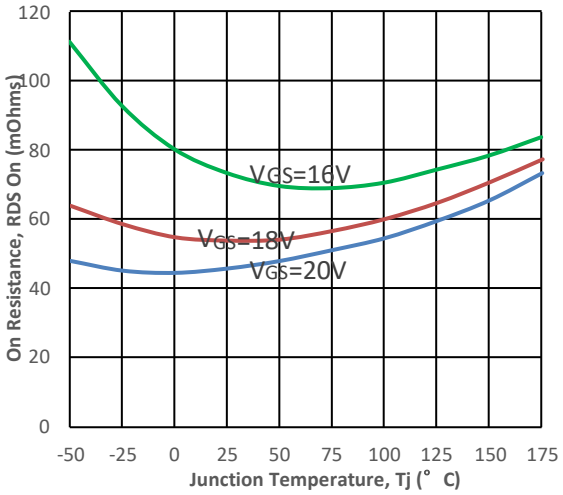


Fig5. Transfer Characteristic

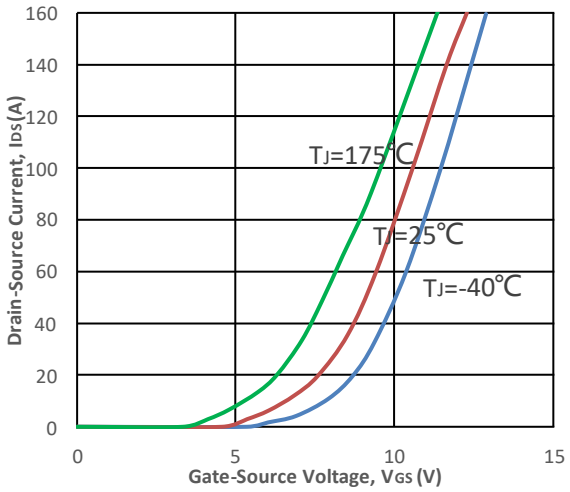


Fig6. Body Diode Characteristic at 25 °C

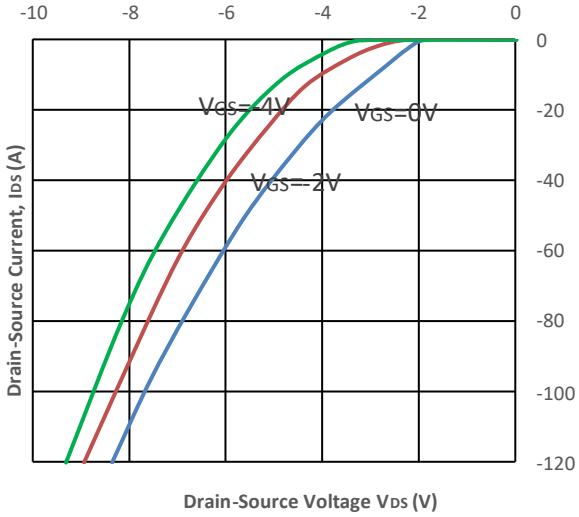


Fig7.Threshold Voltage vs. Temperature

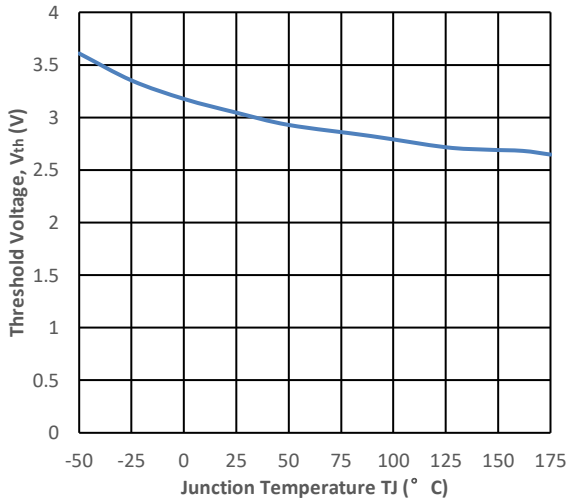


Fig8. Gate Charge Characteristics

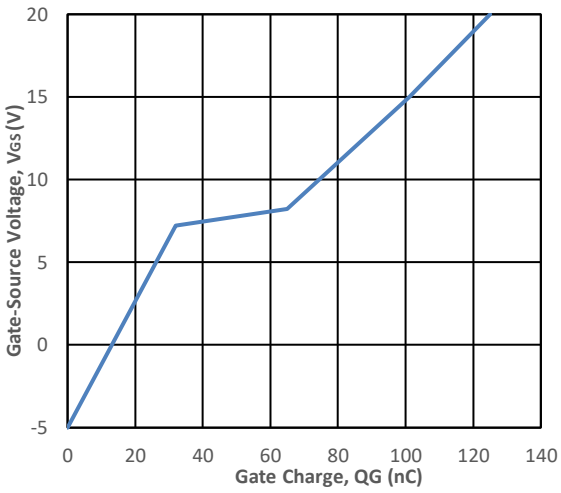


Fig9. 3rd Quadrant Characteristic at 25 °C

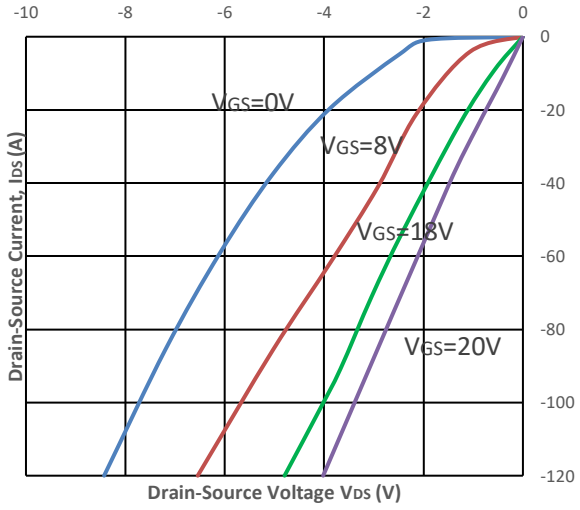


Fig10. Output Capacitor Stored Energy

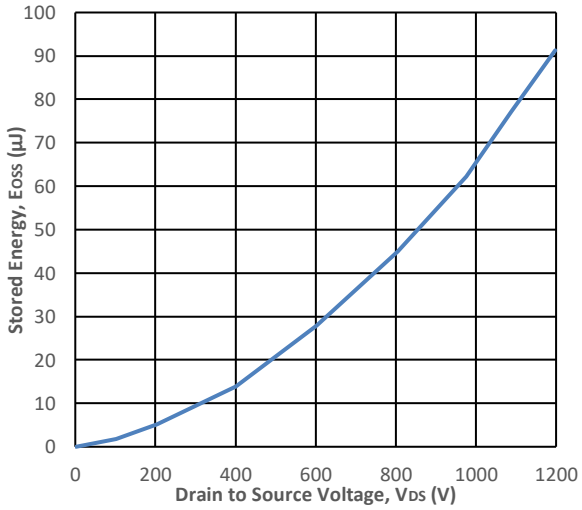


Fig11. Capacitances vs. Drain-Source

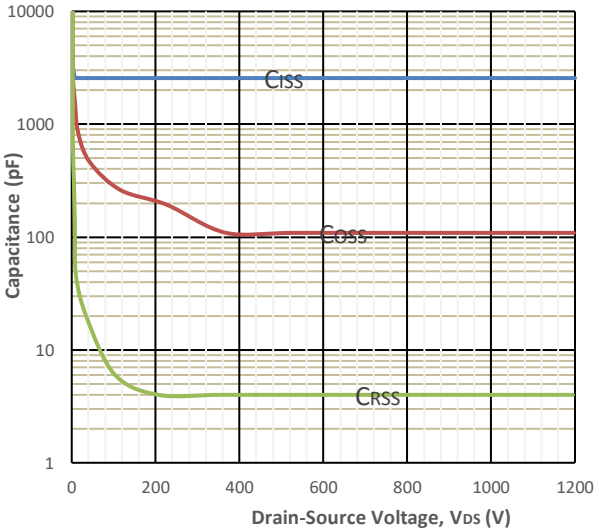


Fig12. Max Power Dissipation Derating Vs Tc

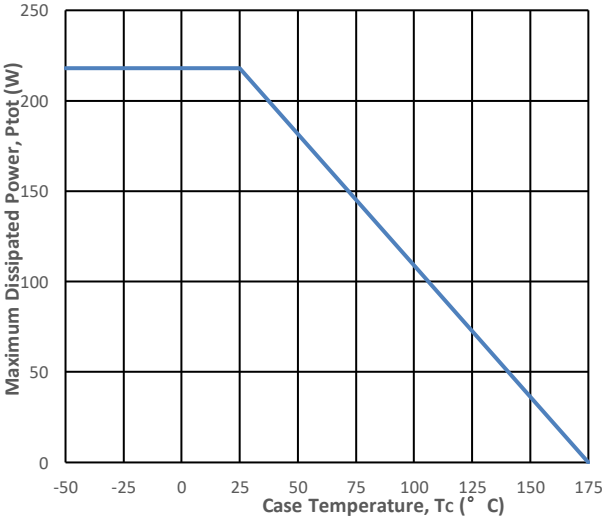


Fig13. Switching Energy vs. Drain Current

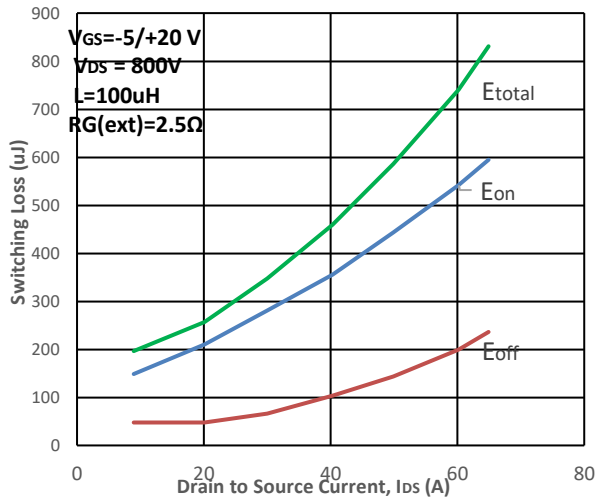


Fig14. Switching Energy vs. RG(ext)

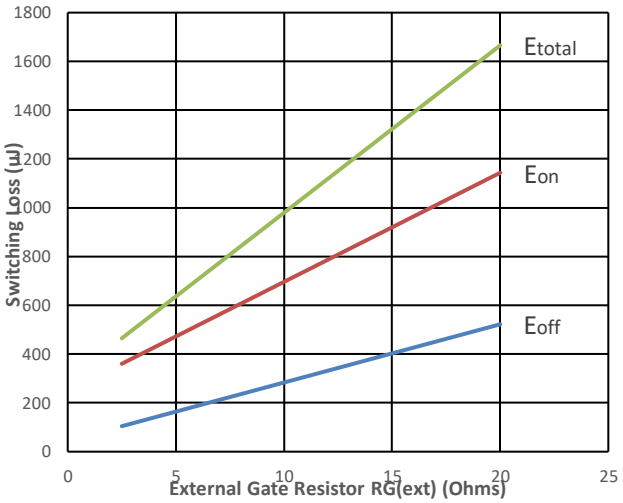


Fig15. Switching Energy vs. Temperature

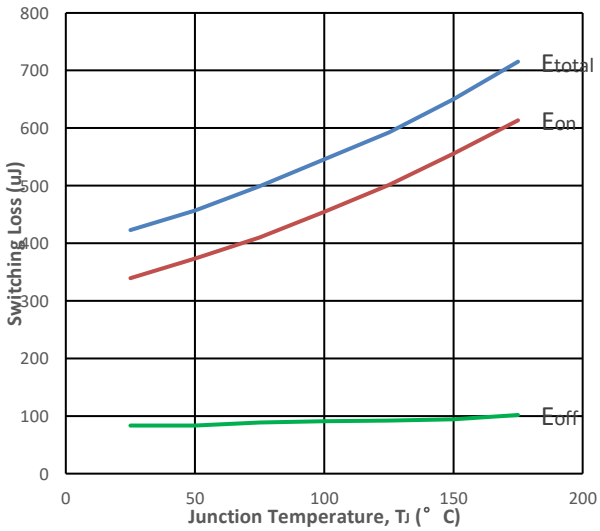


Fig16. Switching Times vs. RG(ext)

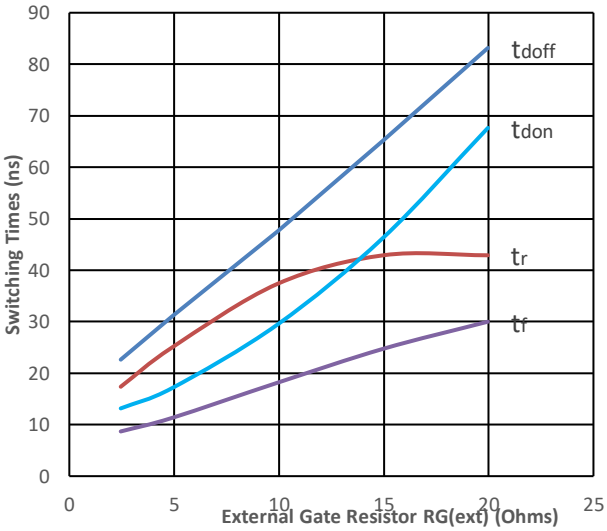


Fig17.Transient Thermal Impedance

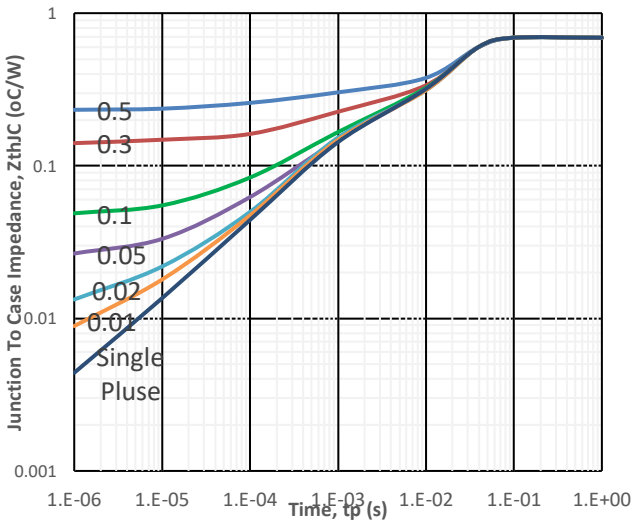
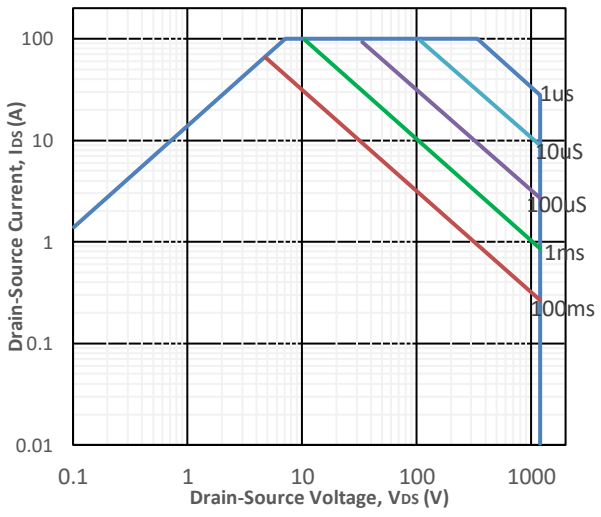
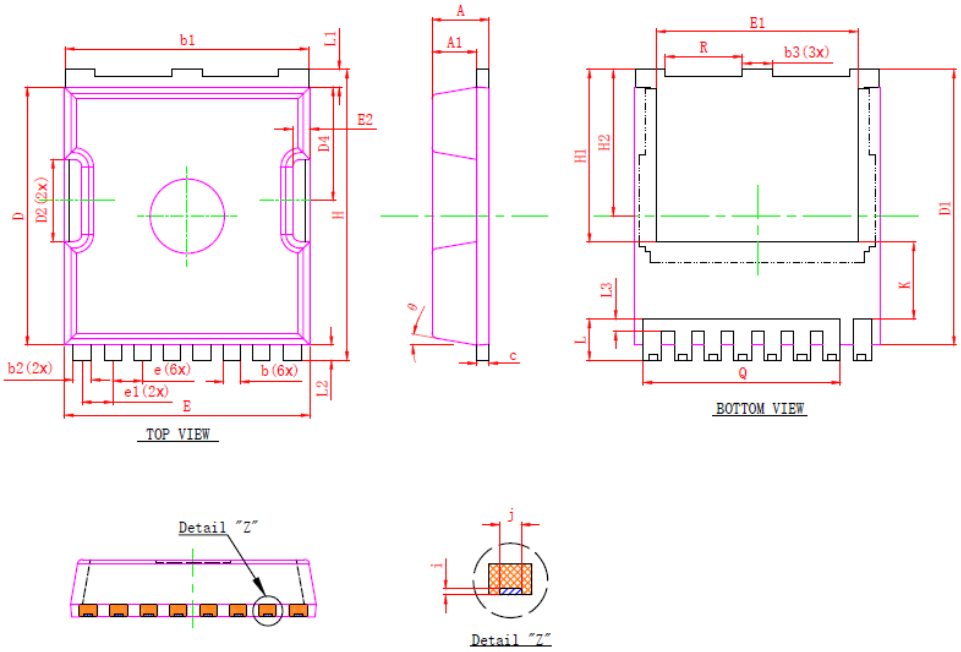


Fig18. Safe Operating Area



Dimensions

TOLL package



Dimensions（ UNIT：mm）

SYMBOL	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.200	2.300	2.400
A1	1.700	1.800	1.900
b	0.600	0.700	0.800
b1	9.700	9.800	9.900
b2	0.650	0.750	0.850
b3	1.100	1.200	1.300
c	0.400	0.500	0.600
D	10.300	10.400	10.500
D1	11.000	11.100	11.200
D2	3.200	3.300	3.400
D4	4.470	4.570	4.670
E	9.800	9.900	10.000
E1	8.000	8.100	8.200
E2	0.500	0.600	0.700
e	1.200 BSC		
e1	1.225 BSC		
H	11.600	11.700	11.800
H1	6.950 BSC		
H2	5.900 BSC		
i	0.100 REF.		
j	0.350 REF.		
k	3.100 REF.		
L	1.550	1.650	1.750
L1	0.600	0.700	0.800
L2	0.500	0.600	0.700
L3	0.400	0.500	0.600
Q	7.950 REF		
R	3.000	3.100	3.200
θ	10° REF.		

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